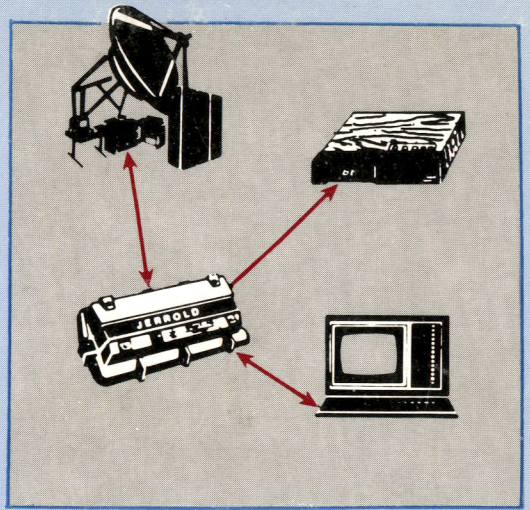

Jerrold

CATV REFERENCE GUIDE RD-14

GENERAL INSTRUMENT

JERROLD CATV

REFERENCE GUIDE

RD-14

April 1983

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TV CHANNEL DATA

Ch.	Frequency in MHz	Carriers in MHz			Wavelength in Inches*		
		Video	Color	Sound	Free Space	3rd Gen.	Air Dielectric
Sub Channels							
T-7	5.75-11.75	7	10.58	11.5		1467.5	1569
T-8	11.75-17.75	13	16.58	17.5		790	845
T-9	17.75-23.75	19	22.58	23.5		540.5	578
T-10	23.75-29.75	25	28.58	29.5		411	439.5
T-11	29.75-35.75	31	34.58	35.5		331.5	354
T-12	35.75-41.75	37	40.58	41.5		277.5	297
T-13	41.75-47.75	43	46.58	47.5		239	255.5
	107.3 MHz	Polling		SECURITY CARRIER			
	T-9	Alarm					
Standard Channels							
2	54-60	55.25	58.83	59.75	212.5	186	199
3	60-66	61.25	64.83	65.75	193.0	167.5	179.5
4	66-72	67.25	70.83	71.75	175.5	153	163.5
5	76-82	77.25	80.83	81.75	153.0	135	142
6	82-88	83.25	86.83	87.75	142.0	123.5	132

	106.5	Addressable Carrier					
	107.3	Security Carrier (Polling)					
	107.7	PlayCable Carrier					
7	174-180	175.25	178.83	179.75	67.5	58.5	62.5
8	180-186	181.25	184.83	185.75	65.0	57	61
9	186-192	187.25	190.83	191.75	63.0	55	58.5
10	192-198	193.25	196.83	197.75	61.0	53	57
11	198-204	199.25	202.83	203.75	59.5	51.5	55
12	204-210	205.25	208.83	209.75	57.5	50	53.5
13	210-216	211.25	214.83	215.75	56.0	48.5	52
				Midbands			
					1st Gen.	**2nd Gen.**	**Air Dielect.**
14	120-126	121.25	124.83	125.75	79.6	84.5	90.5
15	126-132	127.25	130.83	131.75	75.9	80.5	86.5
16	132-138	133.25	136.83	137.75	72.6	77	82.5
17	138-144	139.25	142.83	143.75	69.7	74	79
18	144-150	145.25	148.83	149.75	66.4	70.5	75.5
19	150-156	151.25	154.83	155.75	64.1	68	72.5
20	156-162	157.25	160.83	161.75	61.7	65.5	70
21	162-168	163.25	166.83	167.75	59.4	63	67.5
22	168-174	169.25	172.83	173.75	57.0	60.5	65

★ Velocity of RF in free space - 984.25 ft/microsecond
Velocity of propagation, gas injected P3 = 87% wavelength in inches
Velocity of propagation, air dielectric = 93% wavelength in inches
Velocity of propagation, gas injected P1 = 82% wavelength in inches

TV CHANNEL DATA (Continued)

Ch.	Frequency in MHz	Carriers in MHz			Wavelength in Inches*		
		Video	Color	Sound	1st Gen.	3rd Gen.	Air Dielectric
Super Bands							
23	216-222	217.25	220.83	221.75	44.8	47.5	50.5
24	222-228	223.25	226.83	227.75	43.4	46	49
25	228-234	229.25	232.83	233.75	42.4	45	48
26	234-240	235.25	238.83	239.75	41.0	43.5	46.5
27	240-246	241.25	244.83	245.75	40.0	42.5	45.5
28	246-252	247.25	250.83	251.75	39.1	41.5	44.5
29	252-258	253.25	256.83	257.75	38.2	40.5	43.5
30	258-264	259.25	262.83	263.75	37.2	39.5	42.5
31	264-270	265.25	268.83	269.75	36.3	38.5	41.5
32	270-276	271.25	274.83	275.75	35.8	38	40.5
33	276-282	277.25	280.83	281.75	34.9	37	39.5
34	282-288	283.25	286.83	287.75	33.9	36	39
35	288-294	289.25	292.83	293.75	33.5	35.5	38
36	294-300	295.25	298.83	299.75	33.0	35	37
Hyper Bands							
37	300-306	301.25	304.83	305.75	32.0	34	36.5
38	306-312	307.25	310.83	311.75	31.6	33.5	35.5
39	312-318	313.25	316.83	317.75	31.1	33	35
40	318-324	319.25	322.83	323.75	30.2	32	34.5

41	324-330	325.25	328.83	329.75	29.7	31.5	34
42	330-336	331.25	334.83	335.75	29.2	31	33
43	336-342	337.25	340.83	341.75	28.7	30.5	32.5
44	342-348	343.25	346.83	347.75	28.3	30	32
45	348-354	349.25	352.83	353.75	27.8	29.5	31.5
46	354-360	355.25	358.83	359.75	27.3	29	31
47	360-366	361.25	364.83	365.75	26.9	28.5	30.5
48	366-372	367.25	370.83	371.75	26.4	28	30
49	372-378	373.25	376.83	377.75	25.9	27.5	29.5
50	378-384	379.25	382.83	383.75	25.4	27	29
51	384-390	385.25	388.83	389.75	25.0	26.5	28.5
52	390-396	391.25	394.83	395.75	24.5	26.25	28
53	396-402	397.25	400.83	401.75	24.0	25	27.5
62	402-408	403.25	406.83	407.75	24.0	25.5	27.2
63	408-414	409.25	412.83	413.75	23.7	25.1	26.8
64	414-420	415.25	418.83	419.75	23.3	24.7	26.5
65	420-426	421.25	424.83	425.75	23.0	24.4	26.1
66	426-432	427.25	430.83	431.75	22.7	24.1	25.7
67	432-438	433.25	436.83	437.75	22.4	23.7	25.4
68	438-444	439.25	442.83	443.75	22.0	23.4	25.0

★ Velocity of RF in free space - 984.25 ft/microsecond
Velocity of propagation, gas injected P3 = 87% wavelength in inches
Velocity of propagation, air dielectric = 93% wavelength in inches
Velocity of propagation, gas injected P1 = 82% wavelength in inches

TV CHANNEL DATA (Continued)

Ch.	Frequency in MHz	Carriers in MHz			Wavelength in Inches*		
		Video	Color	Sound	1st Gen.	3rd Gen.	Air Dielectric
Hyper Bands (Continued)							
69	444-450	445.25	448.83	449.75	21.8	23.01	24.7
MISCELLANEOUS CHANNELS							
54	72- 78	73.25	76.83	77.75	132.4	142	152.5
55	78- 84	79.25	82.83	83.75	122.1	132	140
56	84- 90	85.25	88.83	89.75	113.6	122.5	131
57	90- 96	91.25	94.83	95.75	106.0	114	122
58	96-102	97.25	100.83	101.75	99.4	107	114.5
59	102-108	103.25	106.83	107.75	93.8	101	107.5
60	108-114	109.25	112.83	113.75	89.1	95	101.5
61	114-120	115.25	118.83	119.75	83.9	90	96.5

* Velocity of RF in free space - 984.25 ft/microsecond
Velocity of propagation, gas injected P3 = 87% wavelength in inches
Velocity of propagation, air dielectric = 93% wavelength in inches
Velocity of propagation, gas injected P1 = 82% wavelength in inches

CABLE ATTENUATION DATA AT 20 °C*

Cable	1st Generation Gas Injected				Air Dielectric			
	0.412	0.500	0.750	1.000	0.412	0.5000	0.750	1.000
	Loop Resistance - Ohms/1000 ft.							
CU	2.60	1.46	0.68	NA	1.66	1.05	0.46	0.26
CU/AL	3.08	2.04	0.95	0.52	2.31	1.46	0.64	0.35
Sub Channels	Nominal Attenuation dB/100 ft at Video Carrier Frequency							
T-7	0.272	0.201	0.142	0.118	0.025	0.177	0.118	0.095
T-8	0.371	0.274	0.193	0.161	0.306	0.242	0.161	0.129
T-9	0.455	0.332	0.232	0.193	0.368	0.297	0.197	0.158
T-10	0.529	0.383	0.265	0.219	0.420	0.347	0.228	0.183
T-11	0.590	0.427	0.295	0.244	0.468	0.386	0.254	0.203
T-12	0.644	0.466	0.322	0.267	0.511	0.422	0.278	0.222
T-13	0.684	0.518	0.362	0.293	0.549	0.453	0.299	0.239

* To convert data for HRC channels, do as follows: $\sqrt{\frac{f_h}{f_i}}$ where f_h is the HRC frequency and F_i is the IRC frequency. Multiply the result by the listed attenuation for the specific channel.

CABLE ATTENUATION DATA AT 20°C*

Cable	2nd Generation Gas Injected						Drop Cable	
	0.412	0.500	0.625	0.750	0.875	1.000	RG 59	RG 6
	Loop Resistance - Ohms/1000 ft.							
Copper	1.75	1.23	NA	0.56	NA	NA	NA	NA
Copper/Alum	1.93	1.68	1.13	0.76	0.58	0.40	NA	NA
Sub Channels	**Nominal Attenuation dB/100 ft at Video Carrier Frequency**							
T-7	0.237	0.189	0.154	0.130	0.106	0.106	0.712	0.552
T-8	0.322	0.258	0.210	0.177	0.145	0.145	0.970	0.752
T-9	0.394	0.315	0.253	0.211	0.175	0.179	1.173	0.909
T-10	0.456	0.365	0.291	0.237	0.212	0.210	1.345	1.043
T-11	0.508	0.407	0.323	0.264	0.236	0.234	1.498	1.161
T-12	0.555	0.479	0.353	0.289	0.258	0.255	1.637	1.268
T-13	0.596	0.479	0.380	0.323	0.322	0.274	1.764	1.367

Standard Channels	1st Generation Gas Injected				Air Dielectric			
	0.412	0.500	0.750	1.000	0.412	0.500	0.750	1.000
2	0.772	0.593	0.411	0.331	0.061	0.511	0.341	0.271
3	0.813	0.623	0.433	0.348	0.654	0.538	0.359	0.285
4	0.849	0.655	0.456	0.362	0.685	0.553	0.377	0.302
5	0.907	0.704	0.492	0.386	0.733	0.608	0.405	0.328
6	0.941	0.732	0.511	0.401	0.761	0.631	0.421	0.341
7	1.391	1.082	0.768	0.630	1.111	0.911	0.609	0.490
8	1.411	1.104	0.781	0.640	1.130	0.926	0.621	0.499
9	1.434	1.133	0.798	0.651	1.149	0.942	0.631	0.508
10	1.461	1.151	0.811	0.670	1.167	0.957	0.641	0.516
11	1.483	1.168	0.823	0.681	1.185	0.971	0.651	0.524
12	1.499	1.193	0.828	0.690	1.203	0.986	0.661	0.533
13	1.521	1.241	0.840	0.700	1.221	1.001	0.670	0.540

* To convert data for HRC channels, do as follows: $\sqrt{\frac{f_h}{f_I}}$ where f_h is the HRC frequency and F_I is the IRC frequency. Multiply the result by the listed attenuation for the specific channel.

CABLE ATTENUATION DATA AT 20°C* (Continued)

Standard Channels	2nd Generation Gas Injected						Drop Cable	
	0.412	0.500	0.625	0.750	0.875	1.000	RG 59	RG 6
2	0.671	0.541	0.431	0.371	0.315	0.311	2.000	1.550
3	0.707	0.570	0.467	0.390	0.332	0.327	2.106	1.630
4	0.744	0.596	0.489	0.412	0.358	0.347	2.207	1.710
5	0.801	0.637	0.524	0.444	0.384	0.376	2.365	1.830
6	0.831	0.661	0.544	0.461	0.398	0.391	2.455	1.900
7	1.220	0.984	0.789	0.669	0.578	0.580	3.379	2.640
8	1.240	1.000	0.803	0.680	0.588	0.590	3.436	2.686
9	1.261	1.017	0.816	0.692	0.598	0.600	3.493	2.730
10	1.280	1.030	0.829	0.710	0.607	0.609	3.548	2.770
11	1.300	1.046	0.841	0.721	0.616	0.618	3.603	2.810
12	1.331	1.075	0.854	0.730	0.643	0.627	3.657	2.860
13	1.351	1.091	0.890	0.740	0.662	0.636	3.710	2.900

* To find the center frequency of any UHF Channel:

C.F. = 473 + (6 × Ch. # − 14)

Mid Bands	1st Generation Gas Injected				Air Dielectric			
	0.412	0.500	0.750	1.000	0.412	0.500	0.750	1.000
14	1.148	0.900	0.632	0.505	0.924	0.759	0.508	0.408
15	1.176	0.922	0.647	0.517	0.947	0.777	0.520	0.418
16	1.203	0.943	0.662	0.530	0.969	0.795	0.532	0.427
17	1.230	0.964	0.632	0.542	0.991	0.813	0.544	0.437
18	1.260	0.984	0.699	0.561	1.012	0.831	0.555	0.446
19	1.285	1.004	0.713	0.572	1.032	0.848	0.567	0.456
20	1.311	1.024	0.727	0.584	1.053	0.864	0.578	0.464
21	1.337	1.044	0.741	0.601	1.073	0.880	0.589	0.473
22	1.363	1.063	0.754	0.612	1.092	0.895	0.605	0.482

Mid Bands	2nd Generation Gas Injected						Drop Cable	
	0.412	0.500	0.625	0.750	0.875	1.000	RG 59	RG 6
14	1.021	0.802	0.658	0.554	0.481	0.467	2.887	2.246
15	1.046	0.821	0.672	0.568	0.493	0.478	2.957	2.300
16	1.070	0.840	0.688	0.581	0.504	0.489	3.027	2.355
17	1.094	0.859	0.703	0.594	0.515	0.500	3.094	2.407
18	1.122	0.885	0.718	0.610	0.526	0.512	3.160	2.460
19	1.145	0.903	0.733	0.623	0.537	0.522	3.224	2.500
20	1.167	0.921	0.748	0.635	0.548	0.532	3.261	2.510
21	1.183	0.944	0.762	0.646	0.558	0.551	3.287	2.550
22	1.205	0.961	0.776	0.658	0.568	0.561	3.321	2.600

CABLE ATTENUATION DATA AT 20 °C * (Continued)

Super Bands	1st Generation Gas Injected				Air Dielectric			
	0.412	0.500	0.750	1.000	0.412	0.500	0.750	1.000
23	1.550	1.232	0.865	0.725	1.238	1.015	0.680	0.548
25	1.592	1.266	0.888	0.745	1.273	1.043	0.699	0.564
27	1.621	1.297	0.904	0.776	1.385	1.071	0.717	0.580
29	1.661	1.329	0.926	0.795	1.339	1.097	0.735	0.594
31	1.715	1.388	0.971	0.823	1.368	1.130	0.753	0.615
33	1.753	1.419	0.993	0.841	1.398	1.155	0.770	0.628
35	1.784	1.456	1.031	0.851	1.431	1.169	0.786	0.640

Super Bands	2nd Generation Gas Injected						Drop Cable	
	0.412	0.500	0.625	0.750	0.875	1.000	RG 59	RG 6
23	1.361	1.103	0.903	0.755	0.671	0.626	3.762	2.941
25	1.399	1.133	0.928	0.776	0.684	0.643	3.865	3.021
27	1.434	1.179	0.952	0.796	0.702	0.668	3.964	3.101
29	1.469	1.208	0.977	0.815	0.720	0.648	4.062	3.177
31	1.517	1.229	1.000	0.842	0.737	0.704	4.157	3.253
33	1.550	1.257	1.034	0.861	0.760	0.719	4.209	3.326
35	1.592	1.285	1.058	0.882	0.776	0.736	4.340	3.397

Hyper Bands	1st Generation Gas Injected				Air Dielectric			
	0.412	0.500	0.750	1.000	0.412	0.500	0.750	1.000
37	1.814	1.493	1.052	0.868	1.463	1.202	0.802	0.651
40	1.867	1.537	1.083	0.890	1.506	1.235	0.823	0.674
43	1.919	1.580	1.113	0.910	1.550	1.275	0.850	0.690
46	1.970	1.621	1.143	0.934	1.592	1.310	0.877	0.705
49	2.019	1.662	1.171	0.957	1.626	1.337	0.898	0.728
52	2.067	1.702	1.199	0.980	1.667	1.370	0.917	0.750
55	0.919	0.713	0.498	0.391	0.743	0.616	0.410	0.332
58	1.021	0.798	0.556	0.439	0.828	0.681	0.454	0.365
61	1.116	0.878	0.609	0.486	0.902	0.741	0.494	0.397

Hyper Bands	2nd Generation Gas Injected						Drop Cable	
	0.412	0.500	0.625	0.750	0.875	1.000	RG 59	RG 6
37	1.633	1.313	1.082	0.902	0.802	0.752	4.429	3.467
40	1.734	1.358	1.120	0.932	0.833	0.773	4.560	3.569
43	1.763	1.400	1.150	0.955	0.840	0.794	4.686	3.669
46	1.793	1.441	1.179	0.977	0.877	0.816	4.810	3.765
49	1.826	1.468	1.217	1.008	0.908	0.838	4.930	3.859
52	1.879	1.513	1.256	1.038	0.930	0.860	5.048	3.951
55	0.811	0.645	0.531	0.449	0.389	0.381	2.395	1.856
58	0.905	0.713	0.588	0.496	0.430	0.420	2.653	2.056
61	0.922	0.775	0.640	0.537	0.469	0.455	2.815	2.190

★ To estimate attenuation of any unlisted channel, extrapolate the data from the adjacent channels.

CABLE ATTENUATION DATA AT 20 °C * (Continued)

Ultra Hyper Bands	1st Generation Gas Injected				Air Dielectric			
	0.412	0.500	0.750	1.000	0.412	0.500	0.750	1.000
62	2.099	1.728	1.217	0.994	1.693	1.392	0.931	0.761
63	2.114	1.741	1.226	1.002	1.705	1.403	0.938	0.766
64	2.130	1.753	1.235	1.009	1.718	1.413	0.945	0.772
65	2.145	1.766	1.244	1.014	1.730	1.423	0.952	0.777
66	2.160	1.779	1.253	1.024	1.742	1.433	0.958	0.783
67	2.175	1.791	1.262	1.031	1.754	1.443	0.965	0.788
68	2.190	1.803	1.270	1.038	1.767	1.454	0.972	0.794
69	2.205	1.816	1.279	1.045	1.779	1.463	0.978	0.799

Ultra Hyper Bands	2nd Generation Gas Injected						Drop Cable	
	0.412	0.500	0.625	0.750	0.875	1.000	RG 59	RG 6
62	1.907	1.536	1.276	1.054	0.944	0.874	5.116	3.995
63	1.921	1.538	1.285	1.062	0.951	0.880	5.155	4.024
64	1.935	1.559	1.294	1.069	0.958	0.886	5.193	4.044
65	1.949	1.570	1.304	1.077	0.965	0.893	5.230	4.077
66	1.963	1.581	1.313	1.085	0.972	0.899	5.266	4.112
67	1.976	1.592	1.322	1.092	0.978	0.905	5.303	4.146
68	1.991	1.604	1.332	1.100	0.986	0.912	5.338	4.179
69	2.004	1.615	1.340	1.107	0.992	0.918	5.371	4.228

★ To estimate attenuation of any unlisted channel, extrapolate the data from the adjacent channel.

CATV CHANNEL FREQUENCIES, **
STANDARD SYSTEM

Channel	Picture Carrier	Crystal	Crystal Multiplier	Channel	Picture Carrier	Crystal	Crystal Multiplier
T-7	7.0	52.75	X1	2	55.25	101.0	X1
T-8	13.0	58.75	X1	3	61.25	107.0	X1
T-9	19.0	64.75	X1	4	67.25	113.0	X1
T-10	25.0	70.75	X1	5	77.25	123.0	X1
T-11	31.0	76.75	X1	6	83.25	129.0	X1
T-12*	37.0	155.75/73	X1/X1	7	175.25	110.5	X2
T-13*	43.0	161.75/73	X1/X1	8	181.25	113.5	X2
T-14*	49.0	167.75/73	X1/X1	9	187.25	116.5	X2
				10	193.25	119.5	X2
* Two crystals required for double conversion.				11	199.25	122.5	X2
				12	205.25	125.5	X2
				13	211.25	128.5	X2

** Crystal frequencies required to convert channel frequency to IF or IF to channel frequency.

CATV CHANNEL FREQUENCIES, * INCREMENTALLY RELATED CARRIERS				CATV CHANNEL FREQUENCIES, * HARMONICALLY RELATED CARRIERS			
Channel	Picture Carrier	Crystal	Crystal Multiplier	Channel	Picture Carrier	Crystal	Crystal Multiplier
VHF							
2 I	55.25	101.0	X1	2 H	54	99.75	X1
3 I	61.25	107.0	X1	3 H	60	105.75	X1
4 I	67.25	113.0	X1	4 H	66	111.75	X1
7 I	175.25	110.5	X2	7 H	174	109.875	X2
9 I	187.25	116.5	X2	9 H	186	115.875	X2
11 I	199.25	122.5	X2	12 H	204	124.875	X2
13 I	211.25	128.5	X2	13 H	210	127.875	X2
MIDBAND							
15 I (B)	127.25	173.0	X1	15 H	126	171.75	X1
17 I (D)	139.25	185.0	X1	17 H	138	183.75	X1
19 I (F)	151.25	98.5	X2	19 H	150	97.875	X2
21 I (H)	163.25	104.5	X2	21 H	162	103.875	X2

SUPER BAND							
23 I (J)	217.25	131.5	X2	23 H	216	130.875	X2
25 I (L)	229.25	137.5	X2	25 H	228	136.875	X2
27 I (N)	241.25	143.5	X2	27 H	240	142.875	X2
29 I (P)	253.25	149.5	X2	29 H	252	148.875	X2
31 I (R)	265.25	155.5	X2	31 H	264	154.875	X2
33 I (T)	277.25	161.5	X2	33 H	276	160.875	X2
35 I (V)	289.25	167.5	X2	35 H	288	166.875	X2
HYPER BAND							
37 I	301.25	173.5	X2	37 H	300	172.875	X2
39 I	313.25	179.5	X2	39 H	312	178.875	X2
41 I	325.25	92.75	X4	41 H	324	92.4375	X4
43 I	337.25	95.75	X4	43 H	336	95.4375	X4
45 I	349.25	98.75	X4	45 H	348	98.4375	X4
47 I	361.25	101.75	X4	47 H	360	101.4375	X4

★ For unlisted channels:
2X Multipliers - Subtract 3MHz from crystal frequency of adjacent higher channel.
4X Multipliers - Subtract 1½ MHz from crystal frequency of adjacent higher channel.

CATV CHANNEL FREQUENCIES, * INCREMENTALLY RELATED CARRIERS				CATV CHANNEL FREQUENCIES, * HARMONICALLY RELATED CARRIERS			
Channel	Picture Carrier	Crystal	Crystal Multiplier	Channel	Picture Carrier	Crystal	Crystal Multiplier
HYPER BAND (Continued)							
49 I	373.25	104.75	X4	49 H	372	104.4375	X4
51 I	385.25	107.75	X4	51 H	384	107.4375	X4
53 I	397.25	110.75	X4	53 H	396	109.4375	X4
63 I	409.25	113.75	X4	63 H	408	113.4375	X4
65 I	421.25	116.75	X4	65 H	420	116.4375	X4
67 I	433.25	119.75	X4	67 H	432	119.4375	X4
69 I	445.25	122.75	X4	69 H	444	122.4375	X4
MISCELLANEOUS CHANNELS							
55 I	79.25	125.0	X1	55 H	78	123.75	X1
57 I	91.25	149.0	X1	57 H	90	135.75	X1
59 I	103.25	137.0	X1	59 H	102	147.75	X1
61 I	155.25	161.0	X1	61 H	114	159.75	X1

* For unlisted channels:
2X Multipliers - Subtract 3 MHz from crystal frequency of adjacent higher channel.
4X Multipliers - Subtract 1½ MHz from crystal frequency of adjacent higher channel.

dB to VOLTAGE CONVERSION CHART *

For + dBmV		For – dBmV	
dBmV	**Millivolts**	**dBmV**	**Microvolts**
0	1.00	0	1000
+ 1	1.12	– 1	891
+ 2	1.26	– 2	794
+ 3	1.41	– 3	708
+ 4	1.59	– 4	631
+ 5	1.78	– 5	562
+ 6	2.00	– 6	501
+ 7	2.24	– 7	447
+ 8	2.51	– 8	398
+ 9	2.82	– 9	355
+ 10	3.16	– 10	316
+ 11	3.55	– 11	282
+ 12	3.98	– 12	251
+ 13	4.47	– 13	224
+ 14	5.01	– 14	200
+ 15	5.62	– 15	178
+ 16	6.31	– 16	159
+ 17	7.08	– 17	141
+ 18	7.94	– 18	126
+ 19	8.91	– 19	112
+ 20	10.00	– 20	100

* Reference: 0 dBmV = 1 mV as measured across 75 ohm load.

COMPOSITE TRIPLE BEAT *

Channel	12	21	35	52	60
2	12	36	152	435	615
3	15	42	171	456	640
4	12	42	180	473	661
5	8	17	31	48	56
6	8	17	31	48	56
7	10	84	342	788	1048
8	16	83	345	800	1064
9	18	81	348	811	1079
10	19	79	349	821	1093
11	18	75	350	830	1106
12	16	70	349	838	1118
13	10	61	348	845	1129
14		71	274	644	868
15		78	288	666	894
16		82	299	686	918
17		84	308	703	939
18		85	316	720	965
19		85	323	735	979
20		85	329	750	998
21		85	324	763	1015
22		85	328	776	1032
23			345	851	1139
24			342	856	1148
25			337	860	1156
26			332	863	1163
27			326	865	1169
28			321	866	1174
29			315	866	1178
30			309	865	1181
31			301	863	1183

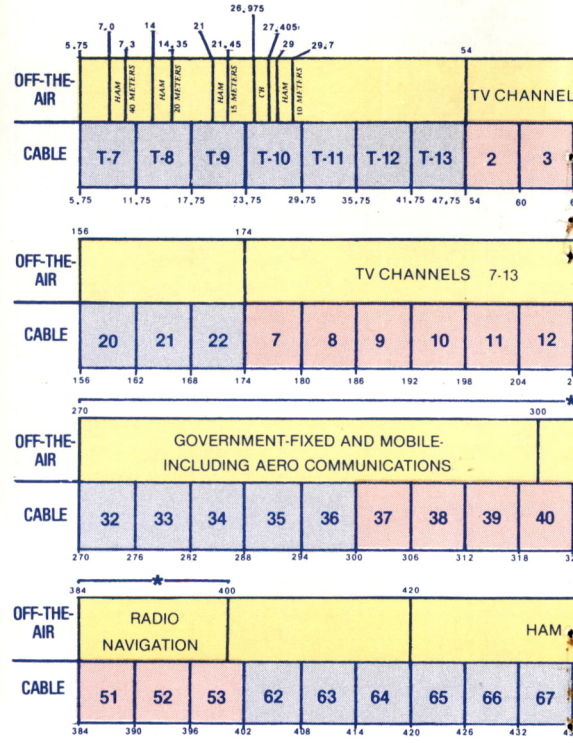
* $A + B - C = D$
$2A - B = D$

COMPOSITE TRIPLE BEAT * (Continued)

Channel	12	21	35	52	60
32			293	860	1184
33			283	856	1184
34			273	851	1183
35			260	845	1181
36			245	838	1178
37				830	1174
38				821	1169
39				811	1163
40				800	1156
41				788	1148
42				775	1139
43				761	1129
44				747	1118
45				733	1106
46				719	1093
47				704	1079
48				688	1064
49				671	1048
50				653	1031
51				634	1013
52				613	995
53					977
54					959
55					940
56					920
57					899
58					877
59					854
60					829
61					801

*A + B – C = D
2A – B = D

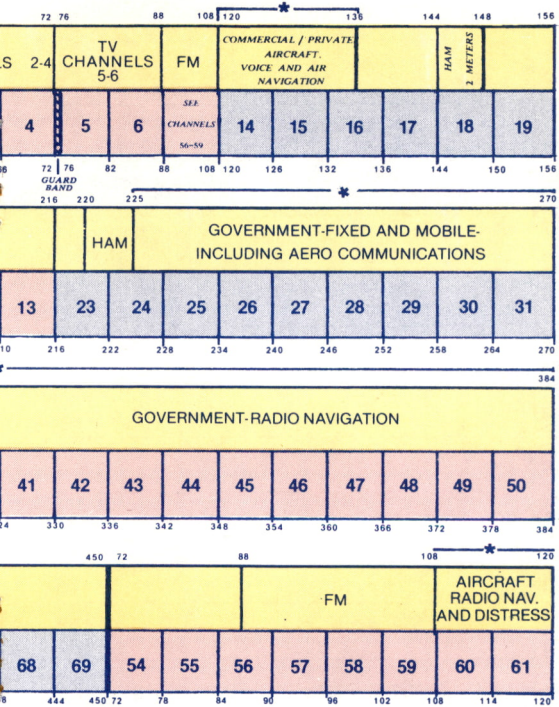
JERROLD CATV FRE



★Operators of all cable television systems must notify FCC annually of all signals carried in these frequency bands (FCC Form 325, Schedule 2).

Note: All frequ
are in M

QUENCY SPECTRUM



uencies shown
Hz.

CATV BANDS

T-7 - T-13	Sub Channels
2 - 13	Standard Channels
14 - 22	Midband
23 - 36	Super Band
37 - 69	Hyper Bands
54 - 61	Miscellaneous

FULL FEATURES TAP, DESCRIPTIVE DATA, 5-450 MHz

Model No.	NOMINAL TAP VALUE	INSERTION LOSS (dB)										NOMINAL TAP-OUTPUT ISOLATION (dB)		
		5 MHz		50 MHz		300 MHz		400 MHz		450 MHZ				
		Nominal	Max	Nominal	Max	Nominal	Max	Nominal	Max	Nominal	Max	10-50 MHz	50-400 MHz	400-450 MHz
FFT2-4TF	3.2	—	—	—	—	—	—	—	—	—	—	—	—	—
-7F	6.8	2.90	3.60	3.00	3.40	3.50	3.90	3.80	4.10	4.10	4.20	23	23	23
-8.5F	8.4	1.90	2.60	2.00	2.40	2.40	2.70	2.50	2.90	2.70	3.10	23	23	25
-10F	9.7	1.50	1.80	1.30	1.50	1.60	1.80	1.70	1.90	1.80	2.00	25	25	25
-12F	11.5	1.00	1.30	0.80	1.10	1.10	1.40	1.20	1.50	1.30	1.60	25	25	25
-14F	14.3	0.75	0.80	0.70	0.70	0.90	1.00	0.90	1.10	1.00	1.20	25	25	25
-17F	16.5	0.50	0.60	0.30	0.50	0.40	0.70	0.50	0.80	0.70	0.90	35	35	35
-20F	19.0	0.40	0.40	0.30	0.40	0.40	0.50	0.45	0.60	0.50	0.70	36	42	36
-23F	22.5	0.30	0.40	0.20	0.30	0.30	0.40	0.35	0.50	0.40	0.60	40	43	40
-26F	25.5	0.30	0.50	0.20	0.40	0.30	0.40	0.30	0.50	0.40	0.60	40	45	40
-29F	29.3	0.35	0.40	0.30	0.30	0.40	0.40	0.40	0.50	0.50	0.60	40	50	40
-32F	32.0	0.35	0.40	0.30	0.30	0.40	0.40	0.40	0.50	0.40	0.60	40	50	40
-35F	34.5	0.35	0.40	0.20	0.30	0.30	0.40	0.30	0.50	0.40	0.60	50	50	50
-38F	37.5	0.30	0.30	0.25	0.30	0.35	0.40	0.40	0.50	0.40	0.60	50	50	50
-41F	40.6	0.30	0.30	0.30	0.30	0.40	0.40	0.40	0.50	0.40	0.60	50	50	50
FFT4-7TF	6.8	—	—	—	—	—	—	—	—	—	—	—	—	—
10F	10.3	3.30	3.70	3.10	3.40	3.40	3.70	3.60	3.70	3.60	3.80	23	23	23
-12F	12.5	2.10	2.50	2.10	2.30	2.30	2.60	2.60	2.80	2.60	3.00	27	25	25

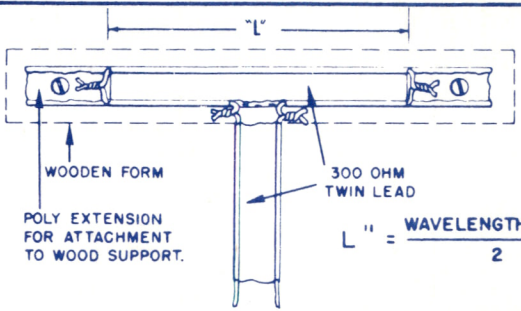
– 14F	14.0	1.60	1.60	1.30	1.50	1.50	1.60	1.60	1.70	1.70	1.90	27	25	25
-15.5F	15.4	1.00	1.10	1.00	1.00	1.20	1.30	1.40	1.50	1.50	1.70	27	25	25
-17F	17.0	0.90	1.00	0.70	0.90	0.90	1.00	1.10	1.30	1.20	1.40	28	30	30
-20F	20.5	0.50	0.70	0.40	0.60	0.60	0.70	0.70	0.90	0.80	1.00	30	35	35
-23F	23.4	0.30	0.50	0.20	0.30	0.30	0.50	0.50	0.70	0.75	0.90	40	40	40
-26F	26.0	0.20	0.40	0.20	0.30	0.30	0.40	0.30	0.60	0.40	0.70	43	45	43
-29F	29.2	0.20	0.30	0.15	0.30	0.20	0.40	0.30	0.50	0.40	0.60	40	45	40
-32F	31.5	0.20	0.30	0.15	0.30	0.25	0.40	0.30	0.50	0.40	0.60	45	50	45
-35F	35.1	0.30	0.30	0.20	0.30	0.30	0.40	0.45	0.50	0.50	0.60	50	50	50
-38F	38.0	0.20	0.30	0.15	0.30	0.25	0.40	0.35	0.50	0.35	0.60	50	50	50
-41F	40.0	0.30	0.30	0.20	0.30	0.30	0.40	0.40	0.50	0.40	0.60	50	50	50
FFT8-10TF	10.5	—	—	—	—	—	—	—	—	—	—	—	—	—
-14F	15.5	2.10	2.60	2.35	2.80	2.65	2.90	2.80	3.10	2.75	3.20	25	40	25
-17F	17.5	1.60	1.80	1.30	1.50	1.50	1.60	1.60	1.80	1.70	1.90	26	40	26
-20F	21.0	0.80	0.90	0.70	0.70	0.95	1.10	1.15	1.30	1.25	1.40	35	45	35
-23F	23.5	0.50	0.60	0.40	0.50	0.55	0.60	0.60	0.80	0.70	0.90	40	50	40
-26F	26.0	0.40	0.50	0.40	0.40	0.45	0.50	0.55	0.70	0.60	0.80	40	50	40
-29F	29.0	0.35	0.40	0.30	0.30	0.40	0.40	0.50	0.60	0.55	0.70	40	50	40
-32F	32.5	0.30	0.40	0.25	0.30	0.30	0.40	0.35	0.50	0.45	0.60	40	50	40
-35F	35.0	0.30	0.40	0.25	0.40	0.40	0.40	0.45	0.50	0.55	0.60	50	50	50
-38F	38.5	0.30	0.40	0.20	0.30	0.30	0.40	0.35	0.50	0.45	0.60	50	50	50
-41F	41.5	0.20	0.30	0.10	0.40	0.30	0.40	0.30	0.50	0.45	0.60	50	50	50

SATELITE SIGNALS

Signal	Satellite	Transponder	Freq. (MHz)	Polarization
ARTS	Satcom III	1	3720	V
ACSN	Satcom III	16	4020	H
BET	Satcom III	9	3880	V
Bravo	Satcom IV	6	3760	H
Cabletext	Satcom III	6	3820	H
CBN	Satcom III	8	3860	H
CBS Cable	Westar III	6	3920	H
Cinemax	Satcom III	23	4160	V
CNN	Satcom III	14	3980	H
C. News Netwk.	Satcom III	15	4000	V
C-SPAN	Satcom III	9	3880	V
Daytime	Satcom III	22	4140	H
ESPN	Satcom III	7	3840	V
Eros	Westar IV	10	—	H
Escapade	Comstar IV	7	3840	V
EWTN	Westar III	12	4160	H
Galavision	Westar IV	12X	—	H
HBO	Satcom III	13, 24	—	H, V
HTN/HTN Plus	Satcom III	16, 21	—	H, V
Lifestyle	Satcom III	3	3760	V

Movie Ch.	Satcom III	5	3800	V
Mdrn. Sat. Net.	Satcom III	22	4140	H
MTV Music	Satcom III	11	3920	V
NTL Christian Network	Satcom IV	7	—	V
NTL Jewish Network	Satcom III	16	4020	H
Nickelodeon	Satcom III	1	3720	V
N. American Newstime	Satcom III	6	3820	H
PTL	Satcom III	2	3740	H
Preview Ch.	Satcom III	21	4120	V
Reuters	Satcom III	18	4060	H
SIN	Westar IV	3X	—	V
SPN	Westar IV	11X	—	V
Trinity (KTBN)	Satcom IV	17	—	V
USA	Satcom III	9	3880	V
WFMT	Satcom III	3	3760	V
WGN	Satcom III	3	3760	V
WOR	Satcom III	17	4040	V
WTBS	Satcom III	6	3820	H

CONSTRUCTION OF 300 OHM, REFERENCE FOLDED DIPOLE



CHANNEL	2	3	4	5	6	FM	7	8	9	10	11	12	13
"L" LENGTH IN INCHES	98.31	89	81.18	71	66		31.62	30.62	29.62	28.68	28	27	26.31

MANUAL SLOPE CONTROL SETTINGS VS. TEMPERATURE

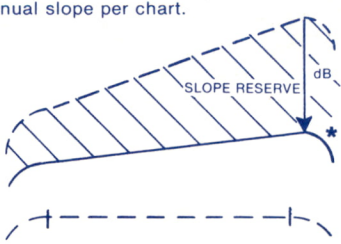
Ambient Temperature		Manual Slope Control Settings		
°F	°C	220 MHz	270 MHz	300,400 Mhz
+ 125	+ 51.5	1 dB	1 dB	1 dB
+ 95	+ 35	1.5 dB	2 dB	1.5 dB
+ 70	+ 21	2.5 dB	3 dB	2.5 dB
+ 50	+ 10	3.5 dB	4 dB	3.5 dB
+ 30	− 1	4.5 dB	5 dB	4.5 dB
+ 10	− 12	5.0 dB	6 dB	5.0 dB
− 5	− 20.5	6.0 dB	7 dB	6.0 dB
− 20	− 29	7.0 dB	8 dB	7.0 dB

NOTES:

1. Ambient temperature is the temperature at the time and location of station. For intermediate temperatures, please interpolate.

2. Manual slope settings are given for the highest video carrier used in the system (Channels 12, 31, 36, or 53), and the dB numbers are reductions from maximum control settings.

Estimate the ambient temperature and reduce manual slope per chart.



* Slope can be "up" or "down"

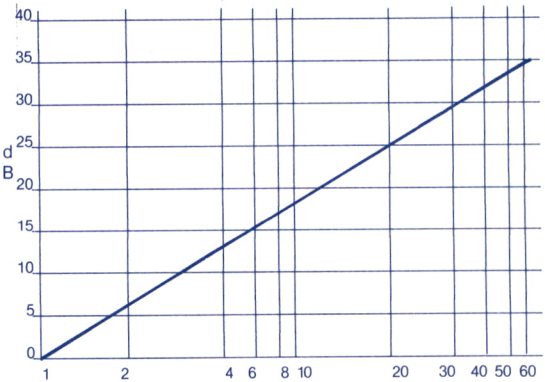
dBm TO VOLTAGE, CONVERSION CHART

dBm Level	Volts		dBm Level	Volts	
	50 OHM	75 OHM		50 OHM	75 OHM
20	2.235	2.739	0	0.2236	0.2739
19	1.993	2.441	– 1	0.1993	0.2441
18	1.776	2.175	– 2	0.1776	0.2175
17	1.583	1.939	– 3	0.1583	0.1939
16	1.411	1.728	– 4	0.1411	0.1728
15	1.257	1.540	– 5	0.1257	0.1540
14	1.121	1.373	– 6	0.1110	0.1373
13	0.9988	1.223	– 7	0.0999	0.1223
12	0.8902	1.090	– 8	0.0892	0.1090
11	0.7934	0.9718	– 9	0.0792	0.0972
10	0.7071	0.8660	– 10	0.0707	0.0866
9	0.6302	0.7719	– 11	0.0630	0.0772
8	0.5617	0.6879	– 12	0.0562	0.0688
7	0.5060	0.6132	– 13	0.0506	0.0613
6	0.4461	0.5465	– 14	0.0446	0.0547
5	0.3976	0.4870	– 15	0.0398	0.0487
4	0.3594	0.4340	– 16	0.0359	0.0434
3	0.3158	0.3869	– 17	0.0316	0.0387
2	0.2815	0.3448	– 18	0.0282	0.0345
1	0.2508	0.3073	– 19	0.0251	0.0307
0	0.2236	0.2739	– 20	0.0224	0.0274

CATV SYSTEM STANDARDS
(For No Noticeable Degradation)

Signal Level to Subscribers	0 to 10 dBmV
Signal to Noise Ratio	43 dB
Signal to Composite Triple Beat	51 dB
Signal to Hum Modulation	40 dB
System Response	± 1½ dB within any channel
Signal to Beat Interference	60 dB
Signal to Reflections	40 dB
Radiation (Within FCC Specifications)	less than 20 uv/m low band and 50 uv/m high band on a tuned dipole at 10 feet.

CHANNEL DERATING CHART



USEFUL EQUATIONS

Wavelength in Meters (Air) = $\frac{300}{\text{Freq. in MHz}}$

Wavelength in Feet (Air) = $\frac{984.25}{\text{Freq. in MHz}}$

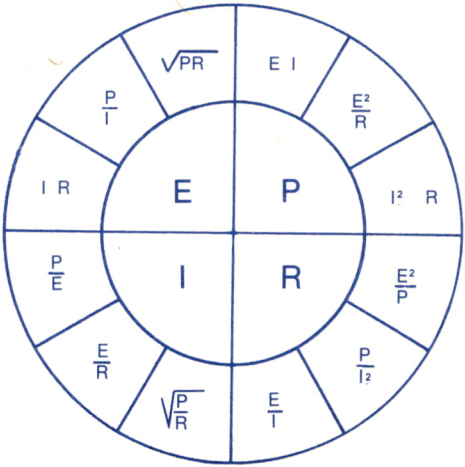
Temperature Conversion

$F° = C° \times \frac{9}{5} + 32$

E_f (Field Intensity in Microvolts per Meter) = .021 E (Field Strength Meter Reading In Microvolts Using Reference Dipole) × f (frequency in MHz).

UHF Channels 14 to 83
Frequencies 470-890 MHz

OHM'S LAW WHEEL

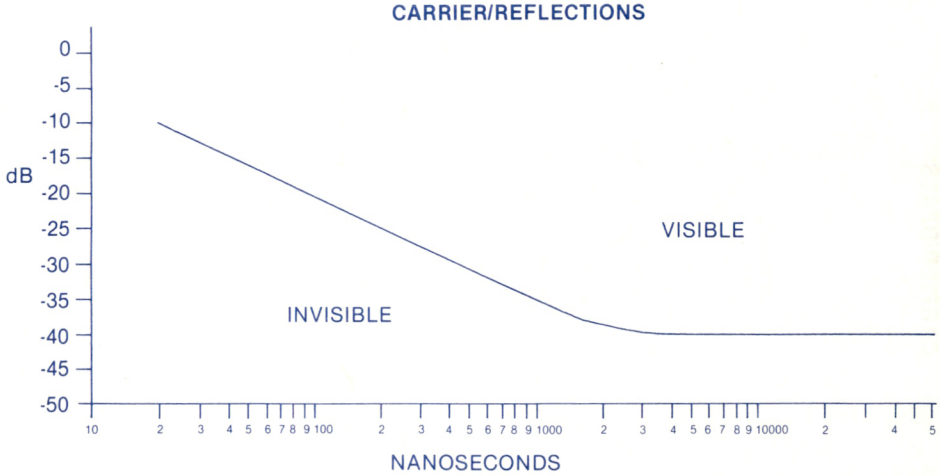


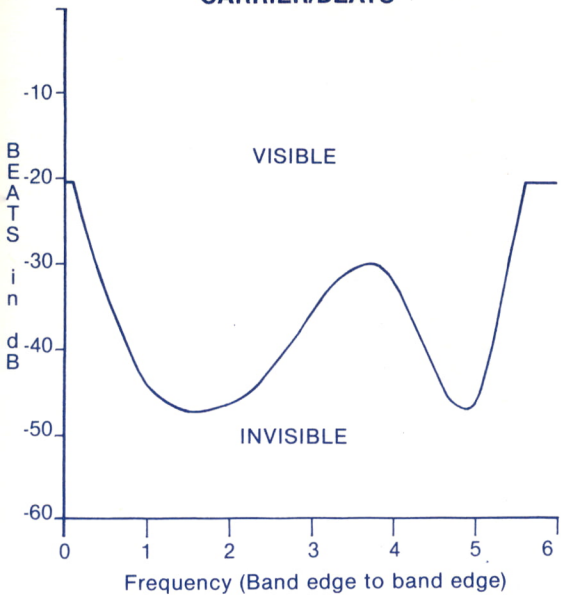
P - POWER IN WATTS

I - CURRENT IN AMPERES

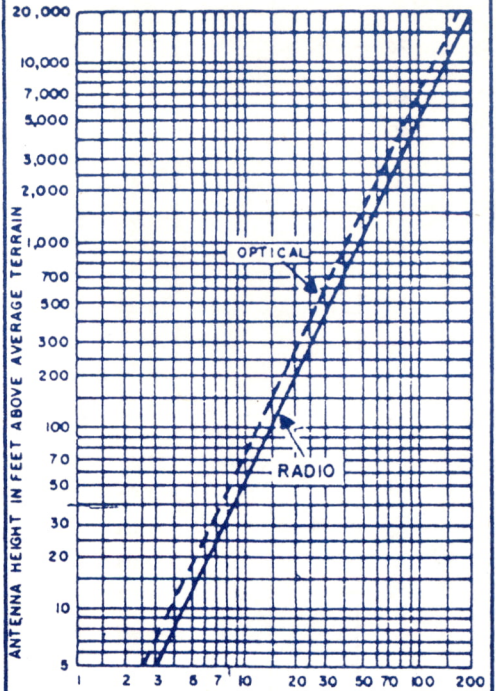
E - VOLTAGE IN VOLTS

R - RESISTANCE IN OHMS


CARRIER/REFLECTIONS
0
-5
-10
-15
dB
-20
-25
-30
-35
-40
-45
-50
VISIBLE
INVISIBLE
10
2
3
4
5
6
7
8
9
100
2
3
4
5
6
7
8
9
1000
2
3
4
5
6
7
8
9
10000
2
4
5
NANOSECONDS

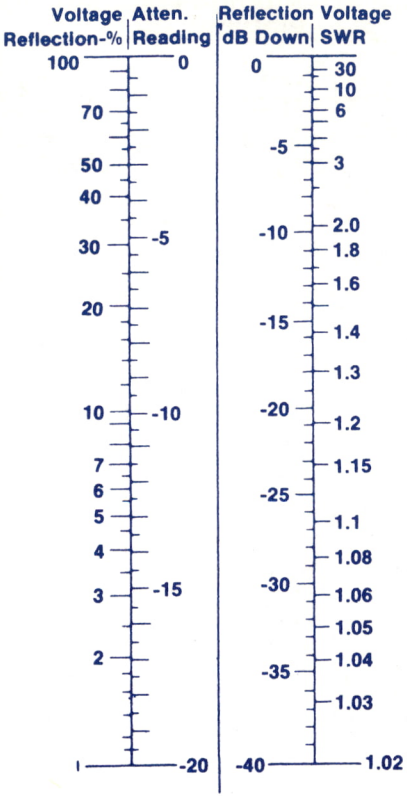

CARRIER/BEATS
-10
-20
-30
-40
-50
-60
BEATS in dB
VISIBLE
INVISIBLE
0
1
2
3
4
5
6
Frequency (Band edge to band edge)

ANTENNA HEIGHT VERSUS DISTANCE



To determine line-of-sight distance between two antennas of different height: Use chart to determine line-of-sight distance for each and then add the two distances.

VSWR CHART



Note:

$$\text{SWR} = \frac{\text{E. Max.}}{\text{E. Min.}} \quad \text{and} \quad \%\ \text{Reflection} = \frac{(\text{SWR})-1}{(\text{SWR})+1} \times 100$$

MAXIMUM ATTENUATION EQUATION FOR PARAMETER 1 CABLE

$$\alpha = \left(\frac{.0058}{D_i} + \frac{.0074}{D_o}\right)\sqrt{f} + \frac{.00041\ f}{\text{Log}\ \frac{D_o}{D_i}}$$

MAXIMUM ATTENUATION EQUATION FOR PARAMETER 3 CABLE

$$\alpha = \left(\frac{.0058}{D_i} + \frac{.0074}{D_o}\right)\sqrt{f} + \frac{.00025\ f}{\text{Log}\ \frac{D_o}{D_i}}$$

Where:

D_o = Inner Diameter of Outer Conductor (inches)

D_i = Diameter of Center Conductor (inches)

f = Frequency in MHz

α = Attenuation in dB/100 ft.

NOISE OF ACTIVE DEVICES

$N_1 = -59$ dBmV + Noise Figure

Like Devices in Cascade

$N_x = N_1 + 10 \text{ Log}_x X$

Where:

X = Number of devices in cascade.

Unlike Devices in Cascade

$$C/N_X = \left[\frac{-C/N_1}{10^{10}} + \frac{-C/N_2}{10^{10}} + \ldots\ldots \frac{-C/N_X}{10^{10}} \right]$$

Where:

C/N_1, C/N_2, etc. = Carrier to noise ratio of one or more like devices in cascade.

THIRD ORDER DISTORTION (B^3)

COMPOSITE TRIPLE BEAT PER NUMBER OF CHANNELS OR CROSS MODULATION

$$B^3_{ch_x} = -57 \text{ dBmV} + 20 \text{ Log}_{10} \left[\frac{CH_X\text{-}1}{CH_{spec}\text{-}1} \right]$$

Where:

$_{ch_x}$ = Actual number of channels

CH_{spec} = Specied number of channels from spec. sheet.

For Like Active Devices in Cascade

$$B^3_X = -57 \text{ dBmV} + 20 \text{ Log}_{10} X$$

Where:

X = Number of active devices in cascade.

USEFUL INFORMATION

Inch = 2.54 centimeters
Foot = 0.3048 meters
Mile = 1.609 kilometers
Statute Mile = 0.8684 nautical miles

PER OUTPUT LEVEL

$$B_L{}^3 = \left[57\ \text{dBmV} + 2\left(L_{spec} - L_{actual}\right)\right]$$

DIFFERENT ACTIVE DEVICES IN CASCADE

$$B_x{}^3 = \left[\frac{-B_1{}^3}{10} + \frac{-B_2{}^3}{10^{20}} + \cdots\cdots \frac{-B_x{}^3}{10^{20}}\right]$$

Where:

$-B_1{}^3$, $-B_2{}^3$, etc. = Distortion for one or more like active devices in cascade.

USEFUL INFORMATION

Millisecond = $1/1000$ of sec.
Microsecond = $1/1000{,}000$ sec.
Nanosecond = $1/1{,}000{,}000{,}000$ sec.
Kilohertz = 1000 × hertz
Megahertz = 1,000,000 × hertz
Gigahertz = 1,000,000,000 × hertz

SECOND ORDER DISTORTION CALCULATIONS (Intermodulation)

For Like Devices in Cascade

$$IM^2_{x\ amps} = IM^2_{1\ amp} + 10\ Log_{10}\ X$$

Where:

IM^2 = Second order intermodulation

X = Number of amplifiers in cascade

$_{1\ amp}$ = Second order distortion listed in specifications

For Unlike Devices in Cascade

$$IM^2_{x\ sources} = \left[10^{\frac{-IM^2_1}{10}} + 10^{\frac{-IM^2_2}{10}} + \ldots\ldots 10^{\frac{-IM^2_x}{10}} \right]$$

Where:

$IM^2_{x\ sources}$ = Active devices in cascade.

IM^2_1, IM^2_2, etc. = Second order distortion for device as listed in the specifications.

At Different Levels in Cascade

$$IM^2_{x\ levels} = IM^2_{spec} - (L_{spec} - L_{actual})$$

Where:

$IM^2_{x\ levels}$ = Second order distortion figure listed in the specifications.

HUM CALCULATIONS

For Like Devices in Cascade

$$H_{x\ amps} = H_{spec} + 20\ \mathrm{Log}_{10}\ X$$

Where:

$H_{x\ amps}$ = The hum of the total number of devices.

$_{spec}$ = Hum figure as given in the specifications.

For Unlike Devices in Cascade

$$H_{x\ sources} = \left[10^{\frac{-H_1}{20}} + 10^{\frac{-H_2}{20}} + \ \ldots\ 10^{\frac{-H_x}{20}} \right]$$

Where:

$H_{x\ amps}$ = Hum of the total number of devices.

$-H_1$, $-H_2$, etc. = Hum figure as given in the specifications for each device.

RULES OF THUMB

1. To calculate the change in attenuation of a cable relative to temperature:

   $\triangle ATT = 1\%$ for each 10°F of change.

2. To calculate the attenuation of a cable if the attenuation at one frequency is known:

   $$\triangle ATT = \sqrt{\frac{f_1}{f_2}}$$

Where:

$\triangle ATT$ = Change in attenuation.

f_1 = First frequency.

f_2 = Second frequency.

3. Input to trunk module should approximate noise figure (N.F.)

TYPICAL JERROLD CATV MAPPING SYMBOLS

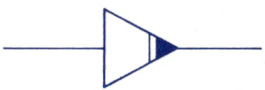
HEADEND

HUB

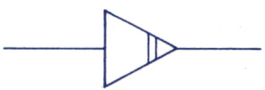
AGC/ASC TRUNK AMP WITH DISTRIBUTION, ONE WAY

MANUAL TRUNK AMP WITH DISTRIBUTION, SUBSPLIT AGC RETURN

AGC/ASC TRUNK AMP WITH MIDSPLIT AGC RETURN

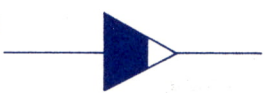


MANUAL TRUNK AMP WITH MIDSPLIT MANUAL RETURN

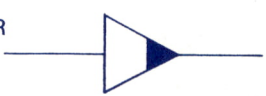


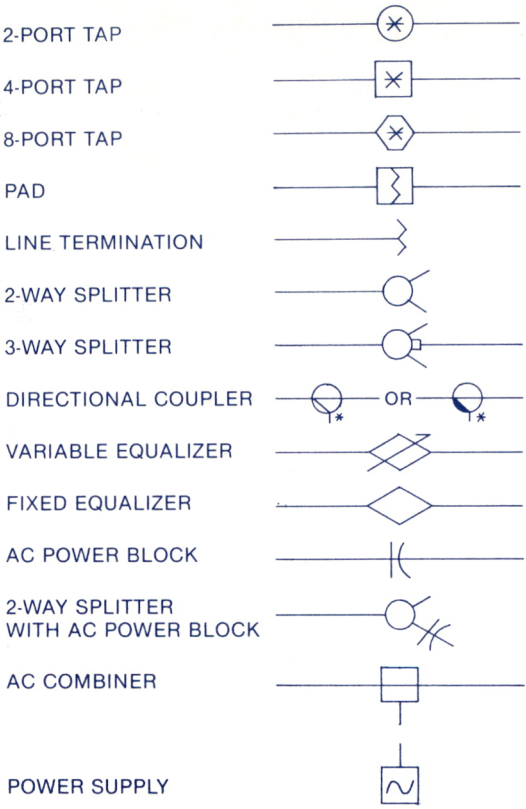
INTERMEDIATE OR TERMINATING BRIDGER, SUBSPLIT MANUAL RETURN

HI-GAIN LINE EXTENDER WITH LO-GAIN SUBSPLIT RETURN



LO-GAIN LINE EXTENDER WITH HI-GAIN SUBSPLIT RETURN





* Values Noted

JERROLD CABLE DATA TRANSMISSION SPECIFICATIONS

- All systems computer controlled
- All data Frequency Shift Keyed (FSK) ± 75 KHz deviation
- Bandwidth requirements 200 KHz

Addressable - Operating Frequency 106.5 MHz. Headend identifies authorized converters and what levels and channels are authorized for descrambling.

PlayCable - Operating Frequency 107.7 MHz. Headend provides a variety of TV games to paying subscribers. Game data transmitted to subscriber's equipment for storage. Stored data used for playing selected game.

Home Security - Headend polls all subscriber locations (107.3 MHz) to detect any alarms and system integrity. Subscriber's equipment replies on a primary frequency (subchannel T9). If event occurs, alarm is sent to headend on another T9 frequency. Alarm is verified by headend on 107.3 MHz. Subscriber's equipment acknowledges on original primary T9 frequency. T9 channels are programmable.

RFI Electronics, Inc.

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San Jose, CA 95125

GENERAL INSTRUMENT